

Type 1 Progress Report: Period November 29, 1973-January 29, 1974

Geologic Analysis and Evaluation of ERTS-A
Imagery for the State of New Mexico
MMC-262

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GSFC ID No. S349
NASA Contract No. NAS5-21861

I. Objectives

The objectives of this investigation are to study ERTS-A images with emphasis on discovering and subsequently investigating previously unrecognized geologic phenomena in New Mexico and to evaluate ERTS-A images as a geologic tool by comparing images with air photos, satellite photos, and geologic and topographic maps of presently recognized features. Locations emphasized are highly mineralized areas and those which have undergone structural deformation, in particular, the Rio Grande Trench and southwestern New Mexico from the Plains of San Augustine on the north extending south to the New Mexico-Mexico border.

II. Accomplishments and Significant Results in this Reporting Period

The mapping of fault and lineament patterns in the Rio Grande Valley from ERTS-A is continuing and has been extended to southwestern New Mexico. It is in the latter area that the

E74-10314) GEOLOGIC ANALYSIS AND
EVALUATION OF ERTS-A IMAGERY FOR THE
STATE OF NEW MEXICO Progress Report, 29
Nov. (New Mexico State Bureau of Mines
and Mineral) 5 p HC \$4.00 CSCL 08G

N74-17101

Unclas
G3/13 00314

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junction between the Colorado Plateau Province and the Basin and the Range Province occurs and through which what has been called the "Texas Lineament" passes. Lowman (1971) has noted that this lineament cannot be seen on the Apollo and Gemini photographs of the area.

The Rio Grande Valley and southwestern New Mexico are the areas within the state in which structurally controlled mineral deposits predominate. Copper, zinc, and lead deposits in the Silver City mineralized porphyries (Santa Rita, Hanover-Fierro, and Pinos Altos) are associated with late Cretaceous to Early Tertiary Laramide activity. Faulting which occurred here during this period has a dominant east-west component; many of these faults have been reactivated.

Metallic mineral deposits in the State of New Mexico have been plotted on a transparent overlay of the 1:1,000,000 ERTS mosaic. Earthquake epicenters between 1964 and 1971 have also been plotted on a similar overlay.

The plotting of lineament and fault patterns in the Rio Grande Trench and in southwestern New Mexico is continuing. Band 5 images at a scale of 1:250,000 are being examined, but actual plotting is done on the 1:1,000,000 mosaic. Identified trends are being compared to existing geologic maps as well as Gemini and Apollo and other available photographs and maps.

During the next reporting period the analysis of fault and lineament patterns and circular features in the Rio Grande Trench and in southwestern New Mexico will be continued.

IV. Published Articles, Papers, Talks

No publications have been submitted during this reporting period although a presentation and discussion concerning the application of ERTS data to New Mexico State agencies was given. This "Seminar on Natural Resource Data Storage and Retrieval; System and Application of Data from the Earth Resources Technology Satellite" was organized by the New Mexico State Planning Office.

V. NDFP Product Related Information

Seven Data Request Forms for retrospective data were submitted to GSFC/NDPF on November 30, 1973. The imagery requested was to complete scenes for which 4 images had not been received. Color composites for the entire state have also been requested. The six composites we have received to date are of much better quality than those received earlier in the investigation. Previously received composites lacked definition in the alluvium.

No Image Description Forms were submitted during this reporting period. A Standing Order Form was submitted on November 30, 1973 in order to continue receiving imagery of northwestern New Mexico after the November 29, 1973 cut-off date. We have also received

high altitude support data along part of the Rio Grande River and for southwestern and west central New Mexico.

Recently received fall imagery of the Jemez and Sangre de Cristo Mountains (1406-17141; Sept. 2, 1973 and 1459-17070; Oct. 25, 1973) is of high quality and these are the first totally snow- and cloud-free ERTS images of these two areas. Most 70 mm negatives we have received have been of poor quality.

Many circular to elliptical features have been identified on the ERTS images, only some of which can be accounted for by existing data. A small number of circular features are adjacent to existing ore deposits, but such relationships should not be emphasized unless other supporting data exists.

Circular features may be tectonically or geomorphically controlled, or a combination of the two. A limited number are man-made. A preliminary listing of features which may have circular expression are listed in Table 1. Photographic examples of identified & unidentified circular features will be included in the final report as will a thorough discussion and analysis. Comparison will be made with existing gravity and magnetic data.

TABLE 1

FEATURES WHICH MAY PRODUCE
CIRCULAR EXPRESSIONS ON ERTS IMAGES

Geomorphic

1. Karst-type solution depressions
2. Circular alluvial fan development
3. Radial and annular drainage expressions
4. Erosional remnants
5. Topographic basins
6. Surficial expression of buried features

Tectonic

1. Plunging anticlines and synclines
2. Volcanic-tectonic depressions and cauldrons
3. Volcanic cones
4. Exposed intrusives
5. Salt domes

Man-made

1. Circular irrigation fields
2. Miscellaneous, i.e. radar station facilities